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ABSTRACT

This paper presents a preliminary analysis of the comparative costs and benefits of closing small rural schools in South Australia. The cost analysis includes accounting for the use of staff, goods, and services; distance education support; land and buildings; and the opportunity cost of children's bus travel time. The assumption that children's time has no economic value is rejected, and a methodology is advanced that estimates the implicit minimum value of students' travel time in the economic framework used for school closure. The analysis also looks at the issue of broadening curriculum options as justification for closing small rural schools and the relationship between the formula for resource allocation to schools and the decision to close schools. Preliminary results from case studies of four small rural schools, as well as data on South Australia government schools, show that costs are not reduced but redistributed by school closure, children's time costs average $2.92 per hour (an implicit valuation of children's time by adults), and the broader curriculum of larger schools benefits only a small percentage of students. Appendices detail the case study methodology and outcomes to date. Contains 59 references. (Author/SAS)

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The economics of (not) closing small rural schools.

Symposium on the Doctor of Philosophy for Candidates and Supervisors: A focus on Rural Issues July 1997

Abstract:

This paper examines the costs and benefits of closing country schools. The cost analysis includes accounting for the use of staff, goods and services, distance education support, land and buildings. A significant cost, not taken into account in most economic assessments of primary and secondary education is the opportunity cost of children's time. Most economic literature assumes that children have no opportunity cost and hence no economic value. This assumption is rejected and a methodology is put forward that estimates the implicit minimum value of student's time into the economic framework used for school closure.

Further, it examines the issue of broadening curriculum options as a justification for closing small country schools and the relationship between the formula for resource allocation to schools and the decision to close schools is also explored.

INTRODUCTION

Should the Government provide a local school with all the curriculum options that an urban school might have; should it close the school and provide a bus or distance education; should it provide hostels for rural students to board at in urban centres or should it provide a narrower curriculum at a local school?

Are small country schools closed because they are relatively expensive? Does closing them save money? Would they be closed if the resource allocation formula currently in place weren't quite so generous to small schools?

Rural school closures in South Australia occur on an opportunistic basis often with lack of breadth of curriculum options being cited as a reason for closure. Is this a good reason? If it is; can a broad curriculum be provided at lower cost? If a school does offer a broad range of subjects, how many students actually take advantage of these opportunities?

LITERATURE REVIEW

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There is a paucity of research in the specific area of interest of my thesis, however the following has provided a sound basis for my research methodology:

- McKenzie, P. Secondary School Size, Curriculum Structure & Resource Use, Phd Thesis, October 1989, Monash University
- McKenzie, P., Harrold, R. & Sturman, A Curriculum Provision in Rural Secondary Schools ACER Research Monograph No.48, 1996, ACER Ltd Melbourne, Australia

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- Curriculum Arrangements and Resource Allocation in Secondary Schools, Harrold, R. & McKenzie, P., 1989
- Scale Economies in Australian Secondary Schools, McKenzie, P., Dec-92
- Size, Costs, Curriculum in Secondary Schools, McKenzie, P., Dec-89
- The System or the Ogre? Effects of System Requirements on Schools' Curriculum Structures, Stone, M. and Harrold, R. Journal of Educational Administration 28,4 p32-45.
- Predictors of High School Academic Course Offerings: The Role of School Size, Monk, D.H. and Haller, E.J., 1993
- The Economics of School Consolidation, Harrold, R, 1968., Master of Economics Thesis, University of Western Australia.

The work by McKenzie and Harrold has provided comprehensive evidence that small schools are more expensive to operate than large schools in Australia. The detailed studies of curriculum costs by Stone and Harrold and by McKenzie has provided methodologies for assessing the within-school cost structures. The method of using salary as an approximation of total resources usage is broadened in my research to include capital, goods and services, community inputs and distance education support. The 1996 report by McKenzie P., Harrold R. & Sturman A., provides a very comprehensive analysis of within-school allocations of resources in Queensland secondary schools, based on staffing allocations. This work showed that senior secondary years were more expensive compared to junior secondary. A number of papers that may have some relevance at the boundaries of my thesis, and will be investigated as contextual issues are included in the bibliography and some are cited throughout this paper.

METHODOLOGY

My thesis research examines systemic data in South Australian Government Schools, and relates differences between metropolitan and country schools. Regression analysis is undertaken of the determinants of school cost. Current policies relating to resource allocation and school closure are analysed. Whilst this research is in its early stages, I have included preliminary outcomes throughout this paper. The other major part of my methodology is the case studies of four South Australian country schools. This too is in its early stages, however a detailed description of the methodology is included in Appendix 1 and preliminary outcomes from one case study are included in Appendix 2.

DISCUSSION

Are their good economic reasons for school closure?

At face value, per-capita expenditures on rural secondary students are higher than for urban secondary students. There is an apparent cross-subsidisation from urban to rural students in South Australia. Figure 1 shows the relatively higher per-capita expenditures in South Australian Government country schools.

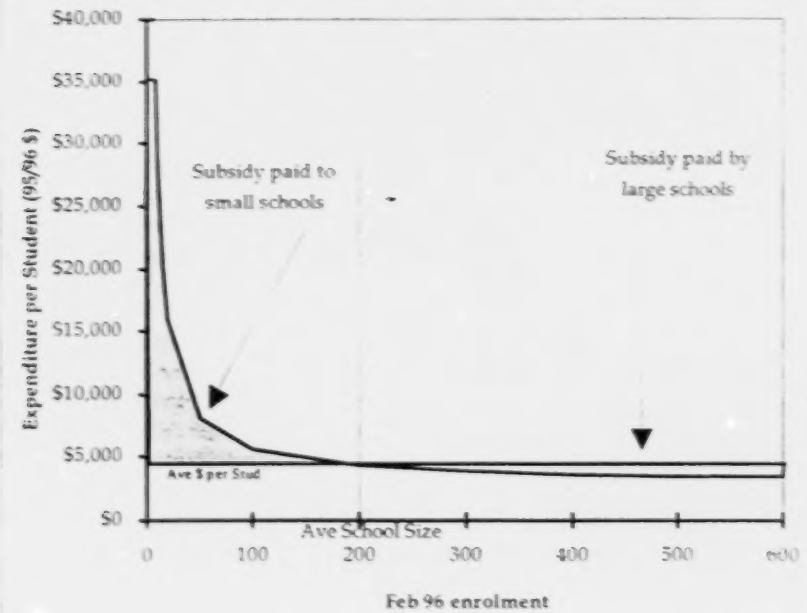
Figure 1: Country/Metro Expenditures per Student

Expenditure per Student	Country	Metro	Grand Total
From DECS	$4,703	$4,088	$4,293
From Community	$301	$358	$339
From All Sources	$5,004	$4,446	$4,632

This table does not include expenditures on capital, distance education, bus transport or locally funded purchases and as such understates the expenditure per student. It is however useful to illustrate the apparent difference between country and metropolitan school funding.

By dividing operating costs at a small school by the enrolment, the cost per student is greater than the cost per student at a larger area school. The obvious reason for this is that every school has fixed and variable operating costs. The fixed costs are usually for administration and include principal salaries, office worker salaries, administration building maintenance and the fixed component of the major utilities such as water, sewerage, electricity, gas and telephone.

Figure 2: Average Cost per Student at South Australian Primary Schools 1996 (Source M.Witham)



The greater the enrolment at a school the thinner the fixed costs are spread. In this 1997 analysis of 1995/96 statistics, schools with fewer than 200 students received greater-than-average funding of $4,100 per student, which was in effect paid for by those schools with an enrolment greater

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than 200. The data in the figure is from a regression analysis[1] of actual school costs and enrolments in South Australia.

Small schools tend to have relatively more smaller classes than larger schools, which is another way that the cost of small schools increases. Monk (1987; p.145) shows that when a secondary school reaches an enrolment of 400, any savings due to elimination of very small classes are exhausted. The relationship between school size and the number of small classes as a percentage of total classes is shown in Figure 3.

Figure 3: Relationship Between School Size and Percentage of Small Classes

Secondary Enrolment	Average Class Size	% Classes of less than 10 students	% Classes of less than 5 students	% Classes of more than 20 students
100	21.58	23%	13%	29%
200	22.00	15%	6%	48%
300	24.36	15%	8%	55%
400	27.87	9%	5%	67%
500	26.06	10%	5%	60%
1000	26.78	16%	4%	60%
1500	25.30	7%	4%	68%
2000	25.84	5%	5%	67%

Source: Monk 1987, p145

By closing small schools, the costs of administration at those schools are eliminated from the system altogether as the school that children are then bused to, would already be paying for these fixed expenditures. In addition to the savings in operating costs, there is also the benefit in being able to sell the surplus school site. Typically in a rural area the value of this land is not great, although in urban areas it can be quite substantial.

McKenzie (1993, p10) asserts that often transport costs are not taken into account in school cost studies and in his study of consolidation in the Wimmera region of Victoria, Nunn (1991) suggested that staff savings provided by large schools may be outweighed by the costs of constructing new school facilities and transporting students greater distances. The work of Holland and Baritelle (1975, p.574) also concludes that in rural areas the savings possible by rural school closure are unlikely to achieve large savings in expenditures. It would appear that in some instances school closures have increased costs when the intention has been to reduce costs.[2]

Even if these researchers are wrong and the closure of rural schools really does achieve 'savings' this does not necessarily make education cheaper. It could, in fact, simply redistribute funding away from small rural schools into other areas of expenditure within primary and secondary education. In South Australia there is a 'back to schools program' (Crafter, 1993 p.1), which directs the proceeds from selling school sites into significant upgrading and backlog maintenance of other school sites. (The most significant of these funds are from the sale of metropolitan secondary school sites.) This is a widely publicised example of redistributing resources within

[1] The outcome of the regression analysis is a formula of the form Total Cost = Fixed Cost plus Marginal Cost x Enrolment. There is research evidence suggesting that the curve in the diagram is actually U shaped, with very large schools having diseconomies of scale. Discussion on this topic is beyond the scope of this paper, however Marshall (1988, pp 2-3) presents an overview of this research.

[2] It may be that these decisions were made to avoid future spending in the rural areas. In SA the future spending on the maintenance of a school is included in the analysis for school closure decisions.

the education portfolio, rather than reducing the costs of education, although the general principle of using savings in one area of education expenditure to increase expenditure elsewhere is widespread.

This discussion has shown that school closures do not necessarily reduce the cost of education, they simply redistribute it. If cost reduction was an important objective of central education authorities, a simpler mechanism would be to increase class size. In South Australia an increase in class size of one student would reduce costs by approximately $25m per annum.[3] In comparison the closure of a rural school with enrolment of 100 students will reduce costs by about $400,000 pa. It is contended that the closure of schools is, in some ways more difficult, than changing the staffing allocation formula, because of the detailed planning, negotiations, bus service extensions and upgrading of schools required to achieve the same level of savings. Changing the staffing allocation formula, can be accommodated by staff attrition, and annual timetabling within schools. From an equity perspective, closing one school to reduce the cost of education to the State would seem less preferable than all schools sharing the cost reduction equally.

My current research project is seeking to quantify the additional resources that are provided to schools such as parental fees and fundraising as well as in-kind support such as use of farm equipment, volunteer assistance and extra-curricular involvement of teaching staff.

Figure 4 shows how country schools in South Australia rely relatively less on community funding than metropolitan schools. (The parent contribution is by way of fees.)

Figure 4: Community and Government Funding

	Country / Metro		
Data	Country	Metro	Grand Total
Sum of Departmental Resources	$274,102,998	$478,851,400	$752,954,398
Sum of Fundraising	$3,510,059	$10,303,550	$13,813,610
Sum of Parent Contribution	$14,058,695	$31,614,534	$45,673,229
Sum of Total Resources	$291,671,752	$520,769,484	$812,441,236
Departmental Funding as % of Total	94.0%	92.0%	92.7%

The Cost of Not Having a Country School

The following discussion examines a hypothetical example where there are 4 small rural schools each within an hours drive of a larger area school. The proposal is to close the 4 schools and bus the children into the larger school. The typical[4] costing of this proposal would include the costs and benefits of amalgamation, versus keeping the separate schools open. The total annual costs of running 5 separate schools is greater than for one area school because five principals and office staff would need to be employed, as well as a fixed charge for some utilities and grounds

[3]This is known from the author's use of the SA Department for Education anbd Children's Services' staffing allocation computer system to model changes in the formula. The use of the actual system rather than a theoretical model means that the actual number of classes before and after the change can be calculated. If this policy was adopted the pupil-teacher ratio (PTR) in SA would still be less than the average PTR for all Australian Government schools.

[4]Typical of the economic cost benefit analysis undertaken in DECS for school amalgamation and closure decision making. This hypothetical example is based on several recent cost benefit studies in SA.

maintenance. In Figure 5, Option 1 is the "do nothing" option where 5 separate schools continue in operation. The annual operating costs for running 5 separate schools is shown as $2.5m per annum with a present value[5] of $43.2m.

Figure 5: Cost Benefit Analysis of School Closure Decision (Simplified Form)

	Annual Cost	PV over 30 Years
Option 1 : Do Nothing		
School Operating Costs	($2,500,000)	($43,230,083)
Option 2 : Amalgamate to One Site		
Sale of Surplus School Sites	$200,000	$200,000
Upgrade of single site	($300,000)	($300,000)
Additional Bus Operating Costs	($100,000)	($1,729,203)
School Operating Costs	($2,260,000)	($39,079,995)
Total Cost	($2,460,000)	($40,909,199)
Net Benefit from Option 2	$40,000 (in year 1 & $140,000 thereafter)	$2,320,885

In comparison, Option 2 shows the costs of amalgamating onto one site. This includes the cash inflow of $200,000 from the sale of surplus school sites at 4 of the towns and the capital costs of increasing/upgrading the accommodation at the one site of $300,000. The net capital cost is a one-off expenditure of $300,000 - $200,000 = $100,000.

In the amalgamation option, school operating costs, which include maintenance on the new buildings, are $240,000 per annum less than the "do nothing" option. However, bus transport costs an extra $100,000 per annum, so the reduction in annual operating costs is a net $140,000 per annum. Thus a one off investment of $100,000 will yield a benefit of $140,000 per annum for the next 30 years. From a central Education Department facilities management perspective this looks like a very attractive investment opportunity.

This analysis has focussed on the capital and recurrent expenditures of each option and has set aside the other costs of education, including the cost of the childrens and parents' time, to simplify the model. The cost of parents' time could be wages foregone or household work foregone. If parents were already travelling into the town for other purposes the cost would have to be reduced. In addition to these opportunity costs, there are also the vehicle operating costs that may or may not be re-imbursed by the Government. This example assumes for simplicity that all children travel to the new school on a school bus and thus parental costs are zero in this example. However, the extra two hours per day that each child is travelling on the bus could be seen as a defacto child care service, that allows the parents to undertake more paid or unpaid work, spend more time with pre-school age siblings,[6] or have more uninterrupted leisure time.

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[5]Present value refers to the discounted cash flow for each of the 30 years. The discount rate is net of inflation, and thus reflects the time value of money. The choice of 30 years as a timeframe is based on the economic life of the building. In simple terms the cost of a decision today (in today's prices) to operate that school for the next 30 years is expressed as the present value.

[6]The economic benefit of Mothers spending more time with pre-school age children is discussed by Hanushek [1992, p99]

This is a benefit of bus travel to the parent. This 'benefit' may be completely offset by the cost of additional anguish and unease for parents whose children are travelling by bus. These parental benefits and costs that result from their children travelling are beyond the scope of this paper.

In this typical analysis, the costs of children's time is assumed to be zero, so it has been initially excluded. However, if we consider the amalgamation option, each child at the four closed schools will travel an additional 2 hours per day. The cost savings from the analysis is $140,000 per year, after investing a net $100,000. If we divide $140,000 by the student travel time, we derive an implicit valuation of the children's time:

Figure 6: Calculation of Implicit Valuation of Children's Time

Y:	Annual Cost Reduction		$140,000
A:	Number of students travelling by Bus	120	
B:	Time per trip (hours)	1	
C:	Trips per day	2	
D:	School Days per year	200	
E:	Total Student Travel Time (E = A x B x C x D)		48,000 hours pa
X:	Cost Reduction Per Student Hour (X = Y/E)		$2.92

In Figure 6 the value of the children's time is implicitly less than $2.92 per hour[7]. If it were exactly $2.92 we would be indifferent about amalgamation. If amalgamation is recommended we must value the children's time at less than the point of indifference in order to make an improvement on the existing situation. This implicit valuation does not make any judgement about what children value their own time at, it is rather an implicit valuation of children's time by adults. It also does not mean that children could earn $2.92 per hour in the labour market. It is the price adults are prepared to pay for a particular 'good'. The 'good' being *'hours of children's time not spent travelling'*.

The figure of $2.92 is based on a purely hypothetical situation and data. A figure of this magnitude may seem reasonable when compared to the adult wage. Another viewpoint might be that an amount of $2.92 per hour could be considered exploitation of children's time if it was a wage. Interestingly, Holland and Baritelle (1975, p.574) pointed out that if only a nominal value is assigned to the value of children's commuting time, decisions to close rural schools may well be reversed.

A related matter is the perception of time by children. It is evident to many parents that a child perceives time, particularly travel time, as being much longer than an adult does - the question

[7]Note, this is a simplification of the calculation as the first year savings are $40,000 and $140,000 every year thereafter. In this example if we adjusted the figures, the average annual benefit allowing for timing of interest would be $134,217 and the cost per student hour $2.80

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"are we there yet?" will be familiar to many parents. The implication of this factor is that the cost per hour in the previous example may be understated.[8]

The Social Costs of Small School Closure

A further area of cost related to small school closure is the social costs of removing schools from small communities. In isolation, the decision to close a small rural school will have little effect on the local economy as there is little direct link between school provision and local economic growth. Only a small percentage of teacher salaries are spent in those communities and the non-salary local expenditure is minimal. In addition many teachers do not live in the community that they teach in (Forsythe et al, 1983 p.184-185) . This finding becomes less likely with very small schools where school staff may make up a comparatively high proportion of the population and where, due to geographic isolation, staff are more likely to live in the community.

The concern is that once the school is closed the town has fewer citizens and other services become uneconomic, which may result in the police station closing and then the post office etc. The school closure can start a spiral of service closures which results in a major depopulation of a small community and leaves the remaining population with few services. The human costs of relocation, population reduction and service reduction are real but unmeasured[9] costs of school closure. The savings in Government expenditure that result from the removal of the school, police station, post office, etc. can be used to benefit other sections of the population such as the urban population. Whether these benefits outweigh the costs to the rural community is the economic issue. The question of whether urban residents should benefit at the expense of the rural residents is an important equity issue, that relies on the judgement of the Politicians involved.

From the perspective of the State, or the Country, any economic loss in a small community has little overall economic significance as the economic loss in the rural town, is often offset by an economic gain wherever the town's population moves to. If we take the view that it doesn't matter from a national perspective, it might be seen as desirable in terms of economic efficiency if the entire population of South Australia moved to Queensland or if the entire rural population of South Australia moved to Adelaide. Both would reduce transportation costs and allow education authorities to achieve economies of scale in "optimally- sized schools". If Australians place a value on having rural towns in existence, then it is worth considering the regional impact of rural school closures.

Is Lack of Curriculum Options a Good Reason to Close a School?

A common rationale for closing small rural schools is to offer students a broader range of curriculum (Forsythe, 1983). This raises several questions: Is a broader curriculum desirable? Do larger schools actually provide a broader curriculum? and, How many students actually take advantage of the broader range of options?

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[8] The psychology and physiology of this issue are beyond the scope of this essay. The perception of time may in fact be related to all subsequent time that has passed for an individual. Each marginal increase in time lived is perceived in relation to the length of time already lived. Alternatively the perception of time may be related to the speed of a persons heart beat.

[9] It may be possible to measure these human costs in aggregate form by the same technique demonstrated earlier in this paper for measuring the implicit costs of student travel time.

Sher (1988) cites research by Powell and Farrar *et al* (1985) that argues for a *"narrower, more unified and focused curriculum"* and states that small rural schools can thrive in this environment. It does not seem clear that a broader curriculum offering is necessarily a desirable objective.

The second question of whether larger schools do provide a broader curriculum, is discussed by Lam (1982 pp.111-114) and Monk (1987 pp.137-150). Lam (1982, p.112) suggests that rural schools with as few as 100 students can offer a broad range of educational programs with sharing of personnel and facilities. Advances in media and communication technology assist in the provision of diverse courses.

Monk (1987, p.142) points out that whilst there may be greater course offerings in larger schools, very few students in the larger schools take up these options. Thus the broader curriculum 'benefit' of small school closure may only benefit a small percentage of students. The initial research I have undertaken in South Australia provides supporting evidence that there are a range of subject offerings that are only taken up by a small number of students and that these subjects are relatively expensive. Languages other than English (LOTE) generally have small classes and it would seem that there are fewer offerings in country schools than there are in metropolitan schools. This may reflect a lower student demand as well as the difficulty in getting teachers.

Figure 7 provides some indication of the number of subject choices at country and metropolitan schools in South Australia, as well as the number of LOTE subjects offered.

Figure 7: Subject Choices in Country/Metro Schools

	Country / Metro		
Data	Country	Metro	Grand Total
Sum of LANGUAGES OTHER THAN ENGLISH	315	722	1037
Sum of Total Subject Choices	7290	10567	17857
Count of School	310	336	646
LOTE Choices per School	1.02	2.15	1.61
Choices per School	23.52	31.45	27.64

This data will be refined to reflect subject options at primary and secondary levels. Strasheim (1989) describes the difficulties of teaching foreign language in small high schools where new languages have very small enrolments and where multi-level classes have special difficulties for language teaching.

The Financial and Educational Impact of Distance Education

It is sometimes argued (Monk, no date) that technology and distance education are the saviours for small rural schools in terms of curriculum opportunities. However this saviour comes at considerable cost in South Australia, at up to three times the cost of face-to-face education. Extra resources are used by rural secondary schools to access distance education courses to provide students with a broad range of subject choices. In one school in my case studies, the cost of year 11 was $30,013 per student. If head office overheads for curriculum, payroll, recruitment, accounts payable, and corporate finance are removed this figure is reduced to $28,600 per student and nearly $10,000 of this is attributable to the distance education provided by the Open Access College.

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The Boarding Option

Not all of the year 11 expenditure would be 'saved' if the school didn't offer schooling beyond year 10, as some of this expenditure is the allocation of administration and grounds expenditures that do not change with enrolment. However, it is very likely that the total expenditures by the school would reduce by enough money to pay for the education and board of these two students at a Catholic boarding school in Adelaide. From discussion with people in the community it appears that many of these student's former cohorts are boarding in Adelaide. Whether these students and their parents would prefer to board, but are unable to afford it and whether the students would receive a better education are questions that I am yet to pursue. It is possible that the Government paying for the board of these two students would be in the interests of the students and the taxpayers. The problem is that the rest of the parents who already can afford to pay for the boarding of their children would object if the Government helped out their neighbours in such a way. The Government would anticipate this pressure from the rest of the community and would not, I suspect, create such a precedent. There is a paradox in that what is possibly the the least cost and best educational option will not be adopted. There is a further paradox in that the local community has a concern that the school will be reduced to a R-10 school, even though most don't send their kids to it after year 10. Reducing to years R-10 could be perceived as the first step towards removing another service from the town.

The Impact of School Size on Curriculum Offerings and Cross-Subsidization between years of schooling.

Schools in rural areas of South Australia are usually smaller than those in urban areas of the State. Two implications of interest are the higher per capita expenditures and fewer curriculum options for students. These issues are addressed by a range of mechanisms in South Australia which are discussed. As relatively fewer students study at senior secondary levels in country schools it makes the cost of providing senior secondary classes more expensive than junior secondary. In metropolitan schools the trend is reversed and senior secondary years tend to subsidise junior secondary years. This implies that in country schools junior secondary is also less well resourced than it is in metropolitan schools. In spite of relatively higher expenditures per student - it is likely that country secondary schooling is generally less well resourced than metropolitan secondary schooling. Figure 8 shows the preliminary research findings on the likely cost subsidisation between secondary years in four different schools.

Figure 8: The relative costs of secondary years

	Enrolment	Year Investigated	Year 8	Year 9	Year 10	Year 11	Year 12
Area school	500	1992	100%	66%	72%	121%	199%
Large Suburban High School	800	1992	100%	101%	98%	117%	80%
Small Suburban High School	300	1992	100%	96%	91%	115%	80%
Small Area School	92	1997	100%	111%	115%	234%	#N/A

The 1992 study showed that year 12 was relatively inexpensive in the urban schools, even though it did have some very small classes. This was due to the large impact of having 20% of the year 12 lessons unsupervised, allowing the centrally allocated staff away from year 12 and back to years 8 to 11. This resulted in relatively more resources being allocated to year 11 than to any other year. The near-Adelaide area school had relatively few students in year 12 and these tended to be much more expensive than the earlier years. It appears that the country school in

1997 has an extremely high additional cost for year 11, compared to the schools investigated in 1992.

Thus it appears that in the small rural secondary school, resources flow away from junior secondary to senior secondary, whilst the opposite is true in the metropolitan schools. (My current research is investigating the direction of cross-subsidisation at four rural secondary schools, ranging from the very small area school shown above to a large country high school).

Efficiency

Cost and Learning Outcomes

The cost of educating children in a small rural school compared to a larger area school, needs to be considered in the context of the learning outcomes of the two alternatives. If the small rural school allows greater learning outcomes, then the cost comparisons discussed so far will be insufficient when deciding whether to close the small school or not. Ideally the learning outcomes and cost per level of student attainment at each school would be known, which would allow a rational decision to be made.

More general consideration can be given to the expected likely learning outcomes of students at the small school, if they were to be bused to the area school. *"Do advantages in better learning through consolidation outweigh the disadvantages of time spent on buses?"* Research on this question (Thibeault *et al*, 1977, pp.17-22) has shown that for those students travelling to area schools in Montana:

- Very few if any evidence of interaction between school bus riding time and school size.
- Specific combinations of school size and travel time do not exist that can account for achievement of test scores.
- Time on bus does not effect score.

A problem with this research is the screening effect of bus travel. If a small school is closed it could mean that only the most committed students in that town will continue their schooling by busing to a larger school. The bus effectively screens out those 'marginal' students who do not perform well at school. The marginal student is one who is only just convinced to continue to year 12. The advent of bus travel may convince these students to leave school. The effect could be that those students busing do better on average and would do better still if they did not have to travel by bus. The research does not explore this possibility,[10] however retention of students in rural areas is typically lower than in urban areas. Similar findings have come from research by Reck (1987), McIntire and Marion (1989), Sares(1992), and Edington and Martellaro(1987) which showed no relationship between school size and academic performance. Moreau (1987) and Green & Stevens (1988) found that small schools do not lower student achievement, but do provide other benefits to students. What this research does tell us is that students will not generally do better in a larger area school than a small rural school. The implication of this finding is that learning outcomes are not an important factor in the decision making process related to small rural school closures.

[10]This would be a useful area of future research - including whether there is a link between bus travel time and retention.

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APPENDIX 1: CASE STUDY : METHODOLOGY

I am currently undertaking a very detailed analysis of the costs of schooling in four rural South Australian Schools. Expenditures at one of these schools have been analysed. This school has a total enrolment of 92 students in years reception to year 11. There are no year 12 students and only 2 students in year 11.

The expenditures allocated to this school can be grouped into:

- Teacher Salaries
- School Support Officer Salaries
- Goundsperson Salary
- Cleaning Expenditures
- Open Access College Expenditures
- Conveyancing allowances paid to parents
- School Bus Expenditures
- Capital Expenditure
- Resource Centre Expenditures
- Land Expenditures
- Goods & Services
- Information Technology
- Equipment and Plant

There are other costs of education at this school, which I have not yet quantified including:

- Expenditures by parents transporting students to school, in excess of the conveyancing allowance.
- The value of students time both travelling and attending the school.
- The value of input from the community into the curriculum, particularly from the Adnamatna people and pastoralists.

These expenditures were allocated to individual students. The per-student expenditures were then aggregated to calculate expenditures per subject and expenditures per year level. The methodology was to separate each expenditure into curriculum, administration, library, transport and grounds. The method of allocating each expenditure group are now described:

Teacher Salaries. The school's timetable was used to allocate teacher salaries to lessons, library and administration. This provided an expenditure per subject figure, which was then divided by the number of students in each class. In some subjects such as year 8,9 and 10 tech studies the female students swapped one of the four lessons for a technical graphics subject provided by the Open Access College's distance education service. Thus in this subject the boys were allocated relatively more of the expenditure than the girls. The girls were allocated additional expenditure for the subject provided by the Open Access College.

A similar approach was taken for other subjects where some students left the lesson for alternative subjects provided by the Open Access College. The salary of a teacher allocated to one class for special education support was divided equally amongst only those students identified as requiring special education. Thus in this single lesson with two teachers present, some students have greater expenditures than others. It was interesting to note that the special education students were not aware that they were the beneficiaries of special treatment. The cost of individual teacher salaries was more than the direct salary expenditure. To the basic salary, amounts were added for superannuation liability, payroll tax, country incentives scheme (liability for future year leave with full pay), locality allowances, housing subsidy, workers compensation liability, mileage, accommodation and temporary relieving teacher salary payments.

School Support Officer Salaries were allocated according to the timetable data. Time allocated to the 'pool' was re-allocated to curriculum areas. The cost of individual School Support Officer salaries was more than the direct salary expenditure. To the basic salary, amounts were added for superannuation liability, payroll tax, Commonwealth Traineeship salary and workers compensation liability.

The Goundsperson Salary was allocated to grounds. The salary overheads were the same as for school support officers with the addition of a uniform allowance.

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Cleaning Expenditures were allocated in proportion to the capital allocation made to subjects, administration and resource centre.

Open Access College Expenditures were determined from a detailed examination of the Open Access College expenditures undertaken in 1995. This included capital expenditure, Telstra, postage, materials and salaries. The expenditure at the College was divided by the enrolment to calculate an average expenditure per student. This average expenditure was then divided by 6 to calculate an expenditure per subject. This per-subject expenditure was then allocated to each student studying each Open Access College subject.

Conveyancing Allowances are paid to parents, where students live more than 5km from a school bus route. Where a family has several students at the school, the conveyancing allowance has been divided equally to each.

School Bus Expenditures include depreciation and all operating expenditures. These have been allocated in proportion to the distance (measured in time) that students travelled to the school.

Capital Expenditure has been calculated as the average depreciation and opportunity cost of capital per annum, over the economic life of the buildings. Services SA (Government Buildings Authority in SA) provided replacement values for each building. An economic life of 50 years is currently anticipated by Services SA. The South Australian Department of Treasury and Finance advise that a real discount rate (excluding inflation) of 5.0% reflects the State Government's opportunity cost of funds. The average interest and opportunity cost have been calculated on the assumption that each building will be replaced every 30 years. Maintenance and minor works expenditures have been excluded from the analysis as these relate to keeping the buildings in an 'as new' condition. Whilst this approach has the benefit of removing 'lumpy' expenditure patterns from an analysis in one year, it does not differentiate between buildings that are 1 year old or 70 years old. An attempt has been made to discount the value of very old buildings. This area will be the subject of further literature review to refine the methodology.

Capital expenditures were allocated to classes based on the number of lessons each week that a class used a particular room. This left a significant amount of un-allocated capital expenditure when rooms were not occupied. This under-utilised capital was allocated to classes in proportion to the direct capital allocation. The exception was the home economics room which was not used at all, as home economics was not being taught in the first semester. The total capital allocation for this room is allocated to home economics, as it is a special purpose space. (This subject also had goods and services expenditures in 1997). If the subject is taught in the second semester, it will reflect these existing allocations.

Resource Centre Expenditures relate to the books, cassettes and videos and not salary expenditures which are shown separately. Resource Centre Expenditures have been calculated in a similar way to capital expenditure. All resources were listed and an attempt was made to categorise these resources according to the subjects taught in the school. An estimate was made of the value of each resource and its economic life. Then an annual 'using up' of resources was estimated. This part of the methodology will also be improved, by adopting some industry standards on asset values and economic life - that are well known to the South Australian Public Libraries Board. As the Resource Centre is also a community library, some resources are allocated to the community library. These are either pre-school or adult resources that are for the benefit of the community rather than for students. Further research will be undertaken to establish whether students do in fact borrow these resources and if so to apportion the expenditure to students and community.

Land Expenditures are allocated to physical education except for the land under the school buildings which is allocated as a part of the capital allocation process. The cost of the land is simply the opportunity cost of 5%, there is no depreciation on land. The value of the land is currently based on a local estimate, and a better valuation method will be investigated. In this school the value of the land is very low, however some of the other schools have substantial land holdings.

Goods and Services. The Department for Education and Children's services makes payments directly on behalf of the school for such things as telephones, utilities, conveyancing allowances, cleaning, and subsidised computer purchases. These are paid directly to the service provider. In addition the Department pays a range of grants to schools, which the schools use to pay for a range of goods and services. Schools also have a separate income from parent fees and fundraising in the community, which they also use to purchase goods and services. The school purchased goods and services can only be ascertained by investigating school records.

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There are also a range of expenditures on goods and services that are excluded from being allocated within the school. The first exclusion is payments made by the Department for the school principal to attend system wide policy and planning meetings as a representative of a class of schools. These exclusions amount to $1,296 in 1996/97.

The second exclusions are those at the school level. These include 'expenditures' in the school accounts which are actually allocations to various equipment and other reserves. These exclusions amount to $15,000 in 1997. A similar exclusion is the difference between school receipts and payments which, in 1997, is a net increase in school reserves of $13,000. Capital expenditures of $24,000 are also excluded, as are expenditures on the resource centre, equipment and training and development expenditures. Each of these are included in other allocative mechanisms. The training and development expenditure is allocated as a staff salary overhead.
The remaining school payments are allocated to curriculum, administration, grounds, community library and excursions. The excursion expenditure is treated in the school accounts as a transit expenditure, where funds come in from the community and other sources and is then used to pay for expenses related to the excursion. In most school accounts, transits are not regarded as either income or expenditure. However, in a relatively isolated school, the excursions are an important part of the curriculum and are subsidised by Commonwealth Government's Country Area Program grants. One of the payments incurred by the school is for use of buses owned by the Department for Education and Children's Services. Hence in the Department's account this amount is recorded as a receipt.

Information Technology is also paid for by both the Department and the school. At the department level a massive IT investment has commenced in 1997 that will see all schools connected to a single network using ISDN lines. This will provide fast internet access to all schools at no direct cost to the school. This investment is expected to cost $80m over 5 years. $20m of this is being used to subsidise schools wishing to purchase new computers. The ISDN and network infra-structure amounts to approximately $10,000 per school per annum, however as this is not yet operating at the case-study school, this amount has not been allocated. The school has received subsidies amounting to $2,500 per annum in 1997 and these have been allocated equally to each student.

In addition to these Departmental expenditures there are school expenditures on IT, which have not as yet been calculated. Further information is required as to the number, value and age of existing computers and modems.

Equipment and Plant has not yet been calculated. The school is in the process of updating its asset register. When the data has been gathered it will be treated in a similar way to capital expenditure. In the model a nominal amount of $500 has been allocated to various subject areas to show the allocative model in completeness. This will be replaced by actual allocations when they are established.

Department for Education and Children's Services Overhead: Expenditure by the Department on things that do not relate directly to the school, such as corporate payroll, recruitment, policy, curriculum policy, facilities management, accounts payable and information technology. These expenditures amount to an estimated $1,400 per student. This amount is included in the analysis for completeness.

Further work to be undertaken: Information has been gathered on travel time of all students, community in-kind input into the school, community output into the community. These factors will be included in the allocative model, once a methodology is developed to quantify them. Part of this process includes establishing the implicit minimum value of students time. This will include an assessment of what it would have cost, if the school was closed and the students were bused 60km to the nearest alternative school location. If after taking into consideration the savings in administration and open access, as well as the increase in transport expenditure, there is a net financial gain in closing the school, then this amount is the minimum implicit value that policy makers place on the students time. This stage of the analysis will involve some detailed modelling where each of the four case study school's are notionally closed to provide the savings in expenditures and additional student travel hours that would be incurred.

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APPENDIX 2: CASE STUDY 1 : OUTCOMES TO DATE

Where does the money come from?

The following Chart, shows the sources of funds. The amount shown as paid on behalf of the school by the Department (DECS) includes the total amounts for Equipment, Resource Centre and Information Technology expenditures. This is not strictly correct as these items were originally purchased by the school using a combination of Departmental and Community funds.

DECS - Paid on Behalf of School	$662,452	66.0%
Past Expenditures by Government	$84,643	8.4%
Past Expenditures by Community	$2,151	0.2%
Local Government (for community library)	$3,600	0.4%
PLAINS (Public Libraries Board)	$2,500	0.2%
DECS Cash Paid via School	$102,249	10.2%
Community Cash Payments	$16,928	1.7%
DECS HO Expenditure Not Directly Related to School	$128,899	12.8%
Total Resources	$1,003,422	100.0%

What is the Money Spent on?

The next chart shows what inputs are purchased with these funds.

Teacher Salary	$422,647	48.3%
SSO Salary	$104,692	12.0%
Groundsperson Salary	$10,805	1.2%
Cleaners	$20,518	2.3%
Open Access College	$35,802	4.1%
Conveyancing	$9,980	1.1%
Bus transport	$78,544	9.0%
Capital Allocation	$73,136	8.4%
Resource Centre Allocation	$15,010	1.7%
Land Allocation	$1,683	0.2%
Goods & Services	$85,665	9.8%
Information Technology	$2,484	0.3%
Equipment & Plant	$580	0.1%
Estimated Increase in Reserves	$12,977	1.5%
Total	$874,523	100.0%

This summary excludes the head office expenditures that do not relate directly to the school. The past expenditure sources of funds represent the using up of capital items that were purchased in previous years. The increase in reserves is not a cost of education in the current period and the Head Office expenditure is that which is not directly related to the school.

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How were these inputs used?

A further question is how were these inputs used in the school?

Total Curriculum	$521,106	61.9%
Library	$39,471	4.7%
Bus Transport	$78,544	9.3%
Conveyancing	$9,980	1.2%
Admin	$177,157	21.1%
Grounds	$15,191	1.8%
	$841,448	100.0%

In addition to these school-use inputs there are also inputs used for the community, which in this case relates to the community library:

School Purposes	$841,448	97.7%
Community Library	$20,098	2.3%
	$861,546	100.0%

Year Level Allocations

The following chart shows the allocations of total resources to different year levels:

Year Level	Allocated Expenditure	%	Expenditure per Student
RE	$45,538	5.4%	$7,590
1	$75,239	8.9%	$8,360
2	$76,220	9.1%	$6,352
3	$69,678	8.3%	$7,742
4	$69,094	8.2%	$6,909
5	$93,284	11.1%	$7,774
6	$55,512	6.6%	$7,930
7	$130,861	15.6%	$10,905
8	$11,427	1.4%	$11,427
9	$63,951	7.6%	$12,790
10	$93,418	11.1%	$13,345
11	$57,224	6.8%	$28,612
Total	$841,448	100.0%	$9,146

Further Data Analysis

I have been able to produce a student profile showing which subjects each student enrols in, how much it costs, what extra-curricular activities students engage in, how long it takes each child to get to school and what conveyancing and bussing expenditures relate to each.

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Metropolitan Comparisons

My intention is to be able to replicate this data analysis at 3 other country schools and I have gathered much of the data. The aggregated data will be compared to an earlier similar study of 2 metropolitan Adelaide high schools and one near-Adelaide area school that I investigated in 1992. I am a little concerned that the situation in metropolitan schools has changed since 1992 and I am considering, undertaking a new investigation of 4 metropolitan schools. Notwithstanding this concern, I am able to comment on some comparisons that I have already made between the single 1997 school that I now have data for and the 1992 data on three schools.

As can be seen in the following chart the allocation of resources to year levels is different in the country school to that of the two metropolitan schools and one near-Adelaide school.

	Enrolment	Year Investigated	Year 8	Year 9	Year 10	Year 11	Year 12
Area school	500	1992	100%	66%	72%	121%	199%
Large Suburban High School	800	1992	100%	101%	98%	117%	80%
Small Suburban High School	300	1992	100%	96%	91%	115%	80%
Small Area School	92	1997	100%	111%	115%	234%	#N/A

In the 1992 study it showed that year 12 was relatively inexpensive in the urban schools, even though it did have some very small classes. This was due to the large impact of having 20% of the year 12 lessons unsupervised, allowing the centrally allocated staff away from year 12 and back to years 8 to 11. This resulted in relatively more resources being allocated to year 11 than to any other year. The near-Adelaide area school had relatively few students in year 12 and these tended to be much more expensive than the earlier years. It appears that the country school in 1997 has an extremely high additional cost for year 11, compared to the schools investigated in 1992.

A comparison of Curriculum expenditure as a percentage of total expenditure for one of the 1992 schools and the 1997 school reveals a similar percentage allocation. (The other 1992 data has not yet been evaluated to enable a further comparison).

	Enrolment	Year Investigated	Curriculum as % of Total Resources
Small Suburban High School	300	1992	67%
Small Area School	92	1997	60%

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